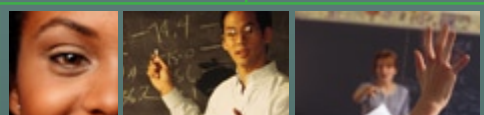


National Aeronautics and
Space Administration

Langley Research Center
Hampton, VA 23681-2199

NASA's TECH.net:

Technology & Education
Clearinghouse Network Newsletter™



<http://dlcenter.larc.nasa.gov>

Winter 2004

Educational Product

Educators Grades K-12

EP-2004-12-19-LARC



NASA's Center for Distance Learning

INSIDE NASA's Tech.Net

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IN THE NEWS

NASA's KSNN™ Is Playing in a Theater Near You

Does the smell of buttered popcorn remind you of the movies? Do you munch on popcorn each time you visit the local theater? Have you ever wondered what makes that popcorn pop? You can discover the answer to this question and many more waiting in the lobby of your local Regal Cinema Theater. Since July, moviegoers have had the unique experience of not only discovering what makes popcorn pop but also of finding out about other cool science, technology, engineering, and mathematics (STEM) facts such as, *"Did you know that Mars is a record-breaking planet?"*

Through a partnership between NASA Langley's Center for Distance Learning in Hampton, Virginia and Regal Cinemas nationwide, NASA programming has become a regular part of the Regal Cinema lobby advertisement. NASA's Kids' Science News Network™ (KSNN™), a series of 1-minute newsbreaks, can be seen in Regal Cinemas throughout the nation. These programs feature kids teaching other kids about common STEM facts and highlighting exciting NASA research. Each episode of NASA's KSNN™ presents standards-based web content, animations, and videos to help explain everyday phenomena, correct misconceptions, and answer frequently asked questions. Designed to meet the needs of grades K–5, NASA's KSNN™ captures the attention of many moviegoers, both young and old. Now everyone can understand questions such as, why is the sky blue and how do you measure time?

Each month, Regal Cinemas showcase two new episodes of NASA's KSNN™. September's questions: Are there grocery stores in space? and Did you know there is a remote-controlled car on Mars?

Eager to answer more fun, fact-filled questions? Access NASA's KSNN™ web site at <http://ksnn.larc.nasa.gov> where you'll find a variety of exciting STEM topics from which to choose and learn.



Did You Know?

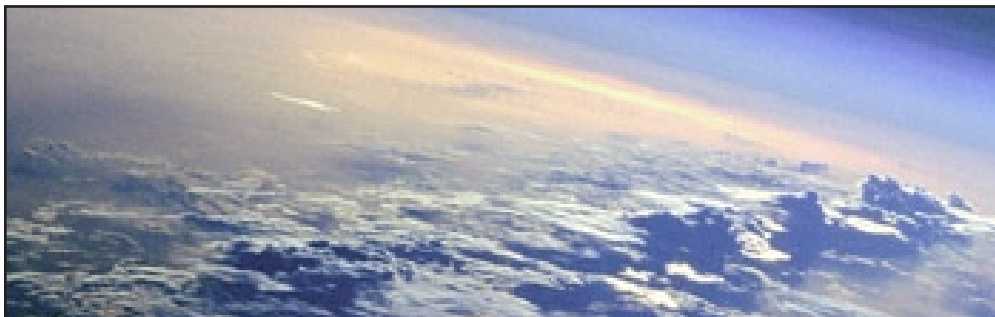
Human activity and nature both regulate Earth's climate. In nature, gases such as carbon dioxide, methane, nitrous oxide, and water vapor, known as **greenhouse** gases, have a warming effect on the Earth. These gases allow the Sun's radiant energy to pass through the atmosphere freely. As the sunlight beams down to the Earth's surface, the oceans and land absorb some of the energy from the sunlight while other rays may be rejected and bounced back to Space as **infrared radiation**. As the **infrared radiation** tries to escape, **greenhouse gases** trap the heat energy in our atmosphere, warming the Earth. This process is called the **greenhouse effect**. Imagine what would happen if the atmosphere did not trap this heat energy. The surface of our planet would be about 60° F cooler than it is.

Since the Industrial Revolution, human activity has increased the amount of **greenhouse gases** in the atmosphere and some scientists believe that this activity is the cause of **global warming**. Global warming, an increase in the Earth's temperature, causes climate changes. What activities are causing the Earth's temperature to rise?

Some scientists believe **biomass burning** is one cause of **global warming**.

Biomass burning is the burning of living or dead vegetation throughout the world to clear land or change the way land is used. It is also the result of lightning-induced fires. When vegetation burns, large quantities of **greenhouse gases**, especially carbon dioxide, are released and could result in the release of a hundred years' worth of stored carbon dioxide.

NASA researchers are currently trying to determine how **biomass burning** and changes in the amount of **greenhouse gases** will affect the Earth's atmosphere and climate. Based on numerous field experiments of different ecosystems, these researchers have developed a model to determine the contribution of **biomass burning** to the total production of **greenhouse gases**. These data will help scientists determine how warm Earth is becoming as well as how to aid in the development of new fire measurement and monitoring instruments that scientists can use from Earth and in space. The data will also aid firefighters as they plan how to control and fight fires.



On the Air

NASA CONNECT™: Good Stress: Building Better Muscles and Bones

Thursday, October 21, 2004
11:00–11:30 a.m. EDT

NASA CONNECT™: The Venus Transit (R)

Thursday, November 18, 2004
11:00–11:00 a.m. EST

NASA CONNECT™: Rocket to the Stars

Thursday, December 16, 2004
11:00–11:00 a.m. EST

NASA CONNECT™: Virtual Earth (R)

Thursday, January 20, 2004
11:00–11:00 a.m. EST

NASA SCI Files™: The Case of the Galactic Vacation (R)

Wednesday, October 20, 2004
11:00 a.m.–12:00 noon EDT

NASA SCI Files™: The Case of the Ocean Odyssey

Wednesday, November 17, 2004
11:00 a.m.–12 noon EST

NASA SCI Files™: The Case of the Radical Ride (R)

Wednesday, December 15, 2004
11:00 a.m.–12 noon EST

NASA SCI Files™: The Case of the Disappearing Dirt (R)

Wednesday, January 19, 2004
11:00 a.m.–12 noon EST

NASA's Destination Tomorrow™

Program 16, Episode 401
Tuesday, October 26, 2004

NASA's Destination Tomorrow™

Program 12 (R), Episode 302
Tuesday, November 23, 2004

NASA's Destination Tomorrow™

Program 13 (R), Episode 303
Tuesday, December 28, 2004

NASA's Destination Tomorrow™

Program 17, Episode 402
Tuesday, January 25, 2005



Word Scramble

Greenhouse Gases

What did you learn? Here is your chance to recall a few of the vocabulary words. Each **boldface** word in the Did You Know? article (in the previous paragraph) contains the merged letters in each line below. Unscramble the letters in the words to reveal the original words. Answers appear on page 12.

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Technology & Instruction

Take a Virtual Field Trip Via NASA LIVE™

By Virginia R. Ewing

Are your students curious about how an airplane flies, what NASA's future for space exploration is, or how to build a rocket? Use the power of videoconferencing with experts to help them find the answers. FREE, videoconferencing resources such as NASA LIVE™ (Learning Interactively through Videoconferencing Experiences) give students the opportunity to interact with NASA experts in a virtual setting. Produced by NASA Langley's Center for Distance Learning (<http://cdl.larc.nasa.gov>) in Hampton, Virginia, NASA LIVE™ offers FREE videoconferencing programs for K–12 teachers, students, and their parents to provide opportunities for learning, instructional enrichment, and professional development. The videoconferences also help participants connect to science, technology, engineering, and mathematics (STEM) related content and to NASA research and careers.

NASA LIVE™ events feature 30- to 60-minute videoconferences that incorporate multimedia and hands-on activities that enrich classroom instruction. Each NASA LIVE™ videoconference allows teachers and students to establish real-world connections with NASA experts and to learn from the engineers and scientists who play important roles in such events as the successful, record-breaking, hypersonic flight of the NASA X-43A. Other videoconferencing topics include biomimetic flight, model making, nanotechnology, and using satellites to track weather.

The recommended technology requirements needed to participate in a NASA LIVE™ videoconference are ISDN phone lines (H.320) or Internet Protocol (H.323) and a Tandberg-type System (128-786 kbs). For more information about videoconferencing and how to schedule a NASA videoconference, access the NASA LIVE™ web site at <http://live.larc.nasa.gov>.

Virginia Ewing, an Educator in Residence at NASA Langley Research Center, also teaches science at Benjamin Syms Middle School in Hampton, Virginia. She has taught middle and high school for 18 years in both Louisiana and Virginia.

Inquiring Minds Want To Know More About... Inquiry

By Sharon Bowers

Science as inquiry. Just what does this phrase mean? One of eight content standards categories promoted by the National Science Education Standards (NSES), inquiry is one of the latest "buzz words" in science education. Described as "a step beyond science as a process," inquiry asks students to think critically and to use science processes and knowledge to solve problems.

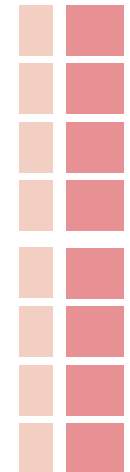
According to NSES, students taught through inquiry will develop

- an understanding of scientific concepts
- an appreciation of "how we know" what we know in science
- skills necessary to become independent inquirers about the natural world
- the disposition to use the skills, abilities, and attitudes associated with science

The chart illustrates the standards for inquiry based on grade levels.

Science as Inquiry Standards

| LEVELS K–4 | LEVELS 5–8 | LEVELS 9–12 |
|--|--|--|
| Abilities necessary for scientific inquiry | Abilities necessary for scientific inquiry | Abilities necessary for scientific inquiry |
| Understanding scientific inquiry | Understanding scientific inquiry | Understanding scientific inquiry |



NASA News Briefs



Hyper-X, X-43A project team

NASA's Scramjet Sets a Guinness World Record

It's faster than a speeding bullet or a speeding train. It is so fast the Guinness Book of World Records has certified NASA's X-43A the world's fastest aircraft with an air-breathing engine. NASA's X-43A accomplished this achievement on March 27, 2004 when it reached Mach 6.8316 or nearly 5,000 miles per hour (mph). Traveling about 7 times the speed of sound, the revolutionary scramjet flew for 11 seconds over the Pacific Ocean. A ramjet-powered missile that flew just beyond Mach 5 held the previous record for an air breathing or jet engine aircraft.

The 2006 Guinness Book of World Records will publish another record-setting fact. NASA's X-43A has since broken its own record. Another NASA X-43A aircraft flew on November 16, 2004 in an attempt to fly at Mach 10 (10 times the speed of sound). Preliminary reports reveal that the vehicle reached nearly Mach 9.8 or 7,000 mph at about 110,000 feet.

NASA's SHARP Program Cultivates Student Interest in STEM

Nearly 75 high school students and first year college students from all around the United States were selected from over 550 applicants to participate in the NASA Summer High School Apprenticeship Research Program (SHARP). Twenty-seven students participated in the commuter part of the program and were assigned to work at NASA Langley Research Center in Hampton, Virginia. The remaining 48 students participated in the residential NASA SHARP-Plus program and resided and worked at two host institutions. Hampton University in Hampton, Virginia and North Carolina A&T served as host sites for the residential students. Sponsored by the National Aeronautics and Space Administration (NASA), the Summer High School Apprenticeship Research Program (NASA SHARP) is designed for students who have demonstrated a strong interest in and aptitude for science, technology, engineering, mathematics, and geography (STEM+G). One of NASA SHARP's objectives is to encourage the career paths of pre-college students who have been traditionally underrepresented in STEM+G fields. This summer's participants had the opportunity to work alongside their NASA mentors, who are top science and engineering professionals that conduct research related to structures and materials, systems engineering, materials research, aerodynamics, aerothermodynamics, and acoustics as well as public affairs, education, and homeland security.

Each year, the selected students work at a designated field center for a minimum of eight weeks during the summer. To learn more about the NASA SHARP program, including educational requirements and the application deadline, access the NASA SHARP web site at <http://www.mtsibase.com/sharp>.

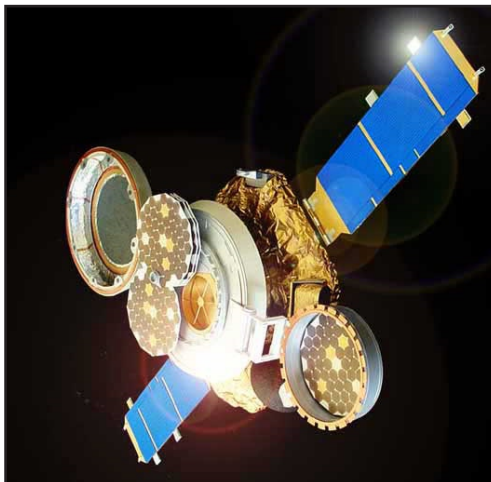


NASA's Pre-Service Teacher Program Celebrates 10-Year Anniversary

The NASA Langley Pre-Service Teacher Program/Norfolk State University (PSTP) in Norfolk, Virginia is celebrating its 10th anniversary of successfully providing pre-service teacher and faculty members opportunities to enhance their knowledge and skills teaching mathematics and science by using technology at the elementary and middle school levels. Since 1995, the NASA/NSU PSTP has offered annual Pre-Service Teacher Conferences (PSTC) and Pre-Service Teacher Summer Institutes (PSTI) that expose students and faculty to motivating presentations by researchers, scientists, educators, and astronauts through invigorating general sessions and by conducting effective hands-on workshops. Held each spring, the NASA/NSU PSTC hosts over 700 prospective elementary and middle school teachers and their faculty from Historically Black Colleges and Universities, Hispanic Serving Institutions, and Tribal Colleges and Universities. The 2005 NASA/NSU PSTC will be held Thursday, February 17 through Saturday 19, 2004 at the Hilton Alexandria Mark Center in Alexandria, Virginia. For additional information about the NASA/NSU PSTP and the annual conference and Summer Institutes, access the NASA PSTP web site at <http://edu.larc.nasa.gov/pstp>.

NASA Genesis: Not a Total Bust

According to initial reports from NASA scientists who have conducted preliminary assessment of the Genesis sample return mission, all may not be lost. Many scientists' skepticism turned to optimism as they worked hard to recover fragments of the Genesis canister and its solar cargo. Orlando Figuero, Deputy Associate Administrator for Programs for the Science Mission Directorate at NASA Headquarters in Washington, DC, reports, "We are bouncing back from a hard landing, and spirits are picking up again."



It appears that approximately three-fourths of the Genesis foils are recoverable. The foils, contained on the canister's lid, were designed to collect isotopes in the solar wind. Other samples of the solar winds contained on hexagonal wafers were damaged, yet some pieces were recovered.

Although the Genesis sample return capsule landed well within its projected ellipse path, the sample return capsule plummeted to Earth on September 8, 2004 after its parachutes failed to open. Traveling at 320 kilometers per hour (nearly 200 miles per hour), the sample return capsule was recovered from the Utah Test & Training Range. Despite the hard landing in the Utah desert, NASA hopes to complete the primary goals of the mission: (1) to measure oxygen isotopes to determine which of several theories is correct regarding the role of oxygen in the formation of the solar system and (2) to analyze nitrogen isotopes that will help us understand how the atmospheres of the planets in our solar system evolved. For the latest updates about NASA's recovery efforts and the mission, visit the Genesis Sample Return Mission at <http://www.nasa.gov/genesis>. For background information about Genesis, visit <http://genesismission.jpl.nasa.gov>.





NASA Has a New Neighbor: The National Museum of the American Indian

The National Aeronautics and Space Administration, along with other Washingtonians, welcomed their newest neighbor, the Smithsonian's National Museum of the American Indian (NAMI) in Washington, DC on Tuesday, September 21, 2004. With its opening ceremonies commemorating the largest tribal gathering in history, it is the first national museum dedicated to the preservation, study, and exhibition of the life, languages, literature, history, and arts of Native Americans.

Located east of the Smithsonian's National Air and Space Museum with the United States Capitol building and the National Mall as its backdrop, the new Washington museum contains unique collections and exhibits that illustrate Native American influence on Earth and beyond. NASA's first Native American astronaut, Commander John Herrington, a proud member of the Chickasaw Nation, has provided the museum with two items—a flute and a decorated bald eagle feather—that he took with him into space on STS-113, the 16th Shuttle mission to visit the International Space Station.

DL Center's Calendar of Events

| <i>Date</i> | <i>Event</i> | <i>Location</i> | <i>Web Site</i> |
|----------------------|--------------|----------------------------|---|
| Oct. 14–16, 2004 | SWE | Milwaukee, WI | http://www.swe.org/ |
| Nov. 4–6, 2004 | CAST | Corpus Christi, TX | http://www.statweb.org/CASTCC/ |
| Nov. 6, 2004 | NAGC | Salt Lake City, UT | http://www.nagc.org |
| Nov. 10–13, 2004 | NAEYC | Chicago, IL | http://www.naeyc.org/ |
| Nov. 10–13, 2004 | NABT | Chicago, IL | http://www.nabt.org/ |
| Dec. 2–4, 2004 | NSTA | (VA – Region) Richmond, VA | http://www.nsta.org/ |
| Jan. 26–28, 2005 | FETC | Orlando, FL | http://www.fetc.org |
| Feb. 7–11, 2005 | TCEA | TX | http://www.tcea.org/ |
| Mar. 29–Apr. 1, 2005 | NCEA | Philadelphia, PA | http://www.ncea.org/ |
| Mar. 31–Apr. 3, 2005 | NSTA | Dallas, TX | http://www.nsta.org |
| Apr. 6–9, 2005 | NCTM | Anaheim, CA | http://www.nctm.org |
| April 3–5, 2005 | ITEA | Kansas City, MO | http://www.iteawww.org/ |
| July 6–9, 2005 | ACM | Monterey, CA | http://www.allianceecm.org/ |
| Oct. 5–9, 2005 | AASL | Pittsburgh, PA | http://www.ala.org/aasl |

CALENDAR





Just Try It!!

Name: _____

Subject: *Science/States of Matter*

Date: _____

Teacher: _____

BACKGROUND

Astronomers have discovered that there may be as many as 100 different states of matter in our universe. On Earth, we usually encounter only three states of matter.

It is easy to understand how everything on Earth can be classified as a solid, a liquid, or a gas. Solids have definite shapes. A liquid takes the shape of the container that holds it. A gas moves and fills up the container in which it exists.

This activity will help you understand how to classify something as a solid, a liquid, or a gas.

PROBLEM

How do you classify different materials? Are they solids, liquids, or gases?

HYPOTHESIS

MATERIALS

bowl or aluminum pie plate
cornstarch (4 tbsp/60ml)
empty container
newspaper
paper towels
plastic spoon
water (2 tbsp/30ml)

PROCEDURE

1. Find objects in your classroom that you believe are solid. List these objects on a sheet of paper. SOLID objects have a shape and will hold that shape when touched or moved.

2. Pour water into a container. Study the water to understand

why it is a LIQUID and not a SOLID. Liquids do not "hold" a shape once they are removed from a container.

3. Blow air onto your hand. You will feel the air moving against your hand. The air is a GAS. You cannot see it but you can feel it. Gases constantly move around within their areas or containers.

4. Place an ice cube on a plate. You will see the ice melt, which shows that one form of matter can change into another state. In this case, we have watched a SOLID change into a LIQUID. Think of other SOLIDS that will change into liquids when they melt. Find objects in your room that you never expect to change into a liquid.

5. Another way we can easily change states of matter needs to occur in a room that has a mirror in it. Blow softly on the mirror. You should notice that where your breath hits the mirror, it "fogs up." You have changed water as a GAS (in your breath) into a LIQUID on the mirror.

6. Sometimes, it is hard to classify objects as one of the three states of matter. Materials can change from one state into another when they are mixed together. Mixing materials can create something new that has unusual properties.

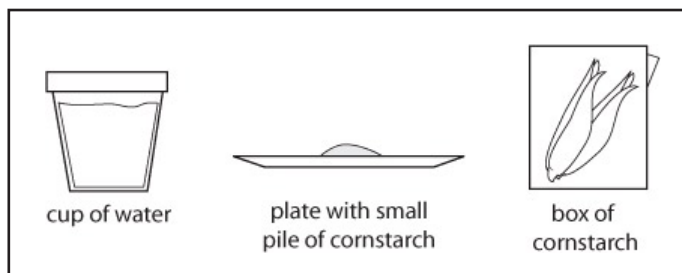
7. Examine your separate containers of cornstarch and water. Are they each a solid, a liquid, or a gas?

8. Predict what you think will happen when water and cornstarch are mixed. Write down your prediction on a sheet of paper. You can check in a few minutes to see if you still agree with your prediction.

9. Mix the listed amounts of water and cornstarch in your pie plate. Stir them with your spoon. Touch the mixture with your fingers. Allow it to "drip" from your spoon.

10. Does the new mixture form as you predicted it would a few minutes ago?

11. It is actually pretty easy to create new materials when you mix things. People do it all the time when they cook! Teachers and Students: If you would like to learn more about the three states of matter and try other cool NASA experiments, visit NASA's Kids' Science News Network™ at <http://ksnn.larc.nasa.gov>.



NASA Discovery:

A Behind-the-Scene Look at NASA Professionals

Hello,

My name is Beth Ann Stringham Shepherd. I am originally from Alexander, New York. Today, I live in the big state of Texas because of my job as an Astronaut Strength, Conditioning, Rehab Specialist with the Astronaut Health and Medical Operations group at NASA Johnson Space Center in Houston, Texas.

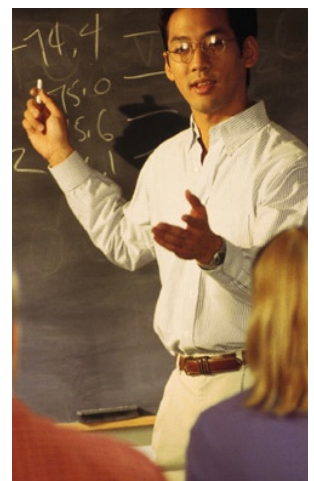
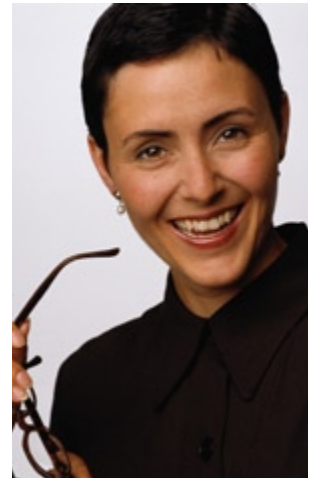
So what exactly is an Astronaut Strength, Conditioning, Rehab Specialist? Well, I am glad that you asked. My job requires me to provide pre-in-post-flight physical training for all astronauts assigned to the International Space Station as well as for unassigned astronauts. I also provide input for exercise countermeasure requirements and exercise hardware. Exercise countermeasures such as cardiovascular fitness, endurance fitness, and muscular strength training are important for astronauts to maintain bone and muscle—whether during pre-flight, in-flight, or post-flight. I help ensure that astronauts receive the best strength and conditioning exercises on Earth and in Space. To achieve this goal, I also help determine the engineering requirements written for the exercise hardware, such as treadmills or exercise bikes. An example of an engineering requirement is to ensure that the treadmill provides enough speed for the astronaut's exercise routine.

Believe it or not, my current job relates to some of my favorite subjects in school—sports anatomy, physiology, and kinesiology. I hope that these are your favorite subjects, too.

My job experience also relates to my college experience. I have two degrees: a Bachelor of Science degree in Physical Education/Corporate Fitness from Slippery Rock University of Pennsylvania and a Master of Arts degree in Exercise Science/Allied Health Research from Southwest Texas State University. Although school was sometimes hard work, it was definitely worth all the time and effort. When I am not working, I love to fly, work out, study martial arts, and participate in equestrian jumping.

Beth's Sage Advice: Teachers, tell your students, "You can accomplish anything you want when you put your mind and effort into it."

To learn more about Beth and her cool job, watch the NASA CONNECT™ episode, *Good Stress: Building Better Muscles and Bones*. For air dates and times in your local area, check out the NASA CONNECT™ web site at <http://connect.larc.nasa.gov>.



From the Teacher's Desk

Video Streaming

Like watching a movie on a DVD or VCR, the use of video streaming in the classroom is becoming increasingly popular among K–12 schools as well as institutes of higher learning. Educators, faculty, and students are making full use of the benefits of this technology as it relates to instructional content and course offerings. From integrating video sources into instruction, to an asynchronous course delivery method, video streaming is a powerful tool that can capture live or pre-recorded audio and video. Compressed into a smaller media file size, it travels via the Internet as a continuous stream of audio and video. Using a special program that decompresses the audio and video, the user can view and hear the continuous stream of media without waiting for large files to download. Most users view streaming video through several free video streaming technologies, such as Apple's QuickTime Player, Microsoft Windows Media Player, and Real Player.

So what exactly are some advantages of using video streaming in the classroom? Video streaming allows educators, faculty, and students to do the following:

- visit virtually impossible locations—inside the human body and around the solar system
- discover new people from diverse backgrounds and geographic locations
- learn new, exciting information not always found in textbooks (due to untimely publication dates)
- demonstrate experiments that are often difficult or nearly impossible to conduct in the classroom
- engage students in inquiry-based and problem-solving activities
- learn through a rich, interactive medium that connects to a variety of learning styles
- introduce and encourage media literacy, analytical skills, and communication abilities
- make connections between classroom content and real-world applications.

Web Resources

Geography

Geographic Learning for Sustainable Development

<http://www.geography.org/sustainable>

Mathematics

Math in Daily Life

<http://www.learner.org/exhibits/dailymath/>

NASA

Global Change Master Directory
Education/Outreach

http://gcmd.nasa.gov/services/param_search/EDUCATION_OUTREACH.html?homepage

Science

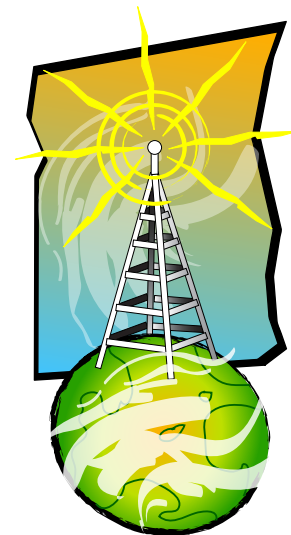
Science is Fun

<http://scifun.chem.wisc.edu/scifun.html>

Technology

The Tech Museum of Innovation: Revolutionaries

<http://www.thetech.org/revolutionaries/>



Teacher Feature

"I have used the NASA Science Files™ for the past 3 years and continue to be impressed by the different topics of interest. The activities are easily customizable and are very motivating."

Nicholas Zrallack

Do you use or have you ever used NASA educational materials and programs for instructional enrichment or professional development? Send your comments and suggestions to NASA to improve the teaching and learning of science, technology, engineering, and mathematics (STEM) concepts. E-mail your comments to **dlcenter+newsletter@larc.nasa.gov** and please include the following information: name, subject taught, grade level taught, name of school, city, and state.

Suggestion Box

Do you have an effective instructional strategy that motivates students to learn more about STEM? Would you like to offer some best practice ideas of how to use distance learning in the classroom? E-mail your suggestions to **dlcenter+newsletter@larc.nasa.gov** and please include the following information: name, subject taught, grade level taught, name of school, city, and state.



About NASA Langley's Center for Distance Learning

NASA Langley Research Center for Distance Learning

<http://dlcenter.larc.nasa.gov>

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Word Scramble Solution

From page 4

Greenhouse Gases

Solution

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| i | n | f | r | a | r | e | d | r | a | d | i | a | t | i | o | n |
| g | r | e | e | n | h | o | u | s | e | e | f | f | e | c | t | |
| b | i | o | m | a | s | s | b | u | r | n | i | n | g | | | |
| g | l | o | b | a | l | w | a | r | m | i | n | g | | | | |

